

Title: ASSESSMENT OF MICROBIOLOGICAL AND PHYSICAL SAFETY: ANTI-REFLUX VALVES ATTACHED TO INFUSION TUBES

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Abstract:

In radiology, anti-reflux valves are attached to infusion tubes to perform magnetic resonance and computed tomography scans. In this sense, there are doubts regarding the safety of patients who use this infusion system. The aim of this research was to evaluate the microbiological and physical safety of anti-reflux valves. Recent culture of *Staphylococcus aureus* - ATCC 25923 (37°C for 24 hours) was used to standardize the bacterial inoculum in saline (10⁸CFU/mL). A total of ten infusion tubes were filled with aliquots of 1.0mL of the standardized bacterial inoculum. Besides, five infusion tubes with only saline were used as a negative control. The infusion tubes were evaluated with respect to the passage of bacteria through anti-reflux valves after pressure exposure to 10psi for 2.5 hours in back flow. The sterility test of bacterial passage for each of the samples was realized in test tubes with 10.0mL of *Tryptic Soy Broth* (BD Difco™, USA) and incubated at 37°C up to 14 days. For confirmation of bacterial contamination by *S. aureus*, positive samples from test tubes were seeded on Petri plates (90x15mm) with *Mannitol Salt Agar* (BD Difco™, USA) and incubated at 37°C for 24 hours. The physical testing of anti-reflux valves was conducted by visual observation of air bubbles formation from valves submerged in water and exposed to 10psi for 30 seconds in back flow. From ten evaluated infusion tubes, only one (10%) anti-reflux valve sample showed bacterial growth, after 24 hours of incubation. In relation to physical test, all samples showed no air passage through anti-reflux valves in back flow. In conclusion, according to our results, anti-reflux valves attached to infusion tubes to perform magnetic resonance and computed tomography scans may not be fully safe. Thus, future researchers are needed to understand how the anti-reflux valves can fail and how to ensure their use with microbiological safety for patients.

Keywords: anti-reflux valve, infusion tubes, *Staphylococcus aureus*